International Civil Aviation Organization

Twelfth Meeting of the Air Traffic Management Sub-Group (ATM/SG/12) of APANPIRG

23 – 27 September 2024

Agenda Item 6: ATM Coordination (Meetings, Route Development, Contingency Planning)

NORTH PACIFIC (NOPAC) ROUTE SYSTEM REDESIGN

(Presented by United States of America, FAA and Japan, JCAB)

SUMMARY

This Working paper provides an update to the NOPAC Redesign Project. This is a joint effort by JCAB, FAA and IATA to improve the efficiency of operations in the NOPAC Route System in the Fukuoka and Anchorage Oceanic FIRs. Through a phased implementation, the new NOPAC Routes will utilize the PANS-ATM, 23 NM lateral separation minima. The NOPAC Redesign project is currently in Phase 2, the published routes have been compressed into a smaller airspace volume and more airspace has been made available for User Preferred Routes (UPRs) and other more efficient flexible routing alternatives. While benefits are being realized from the project, controllers have been facing challenges caused by data link network outages and individual aircraft loss of data link connection. In addition to providing status updates for the NOPAC Redesign Project, this paper calls for the development of contingency procedures to enable continued use of lateral PBCS minima during data link connectivity outages.

1. INTRODUCTION

NOPAC REDESIGN PROJECT STATUS

1.1 The NOPAC Redesign Project is a joint effort by JCAB, FAA and IATA to improve the efficiency of the NOPAC airspace. The project has begun to reduce the lateral spacing between the routes and make more airspace available for more efficient UPRs and flexible routes. To reduce the lateral spacing between the routes, the PANS-ATM 5.4.1.2.1.6, 23 NM lateral separation minimum is required between the NOPAC Redesign Phase 2 and 3 routes from FL340 through FL400. For ATC to apply this minimum, aircraft must be RCP240, RSP180 and RNP4 approved. The aircraft must also have an operating data link connection with the ATC System. The percentage of aircraft in the NOPAC airspace with both PBCS and RNP4 approvals is high, around ninety-five percent (see **Figure 1**). Aircraft without the required PBCS and RNP4 approvals are accommodated on R220 or R580 at FL330 and below or FL410 and above. Another option for aircraft without the required PBCS/RNP4 approvals is to flight plan on ATS Route A590 or south without any altitude restrictions.

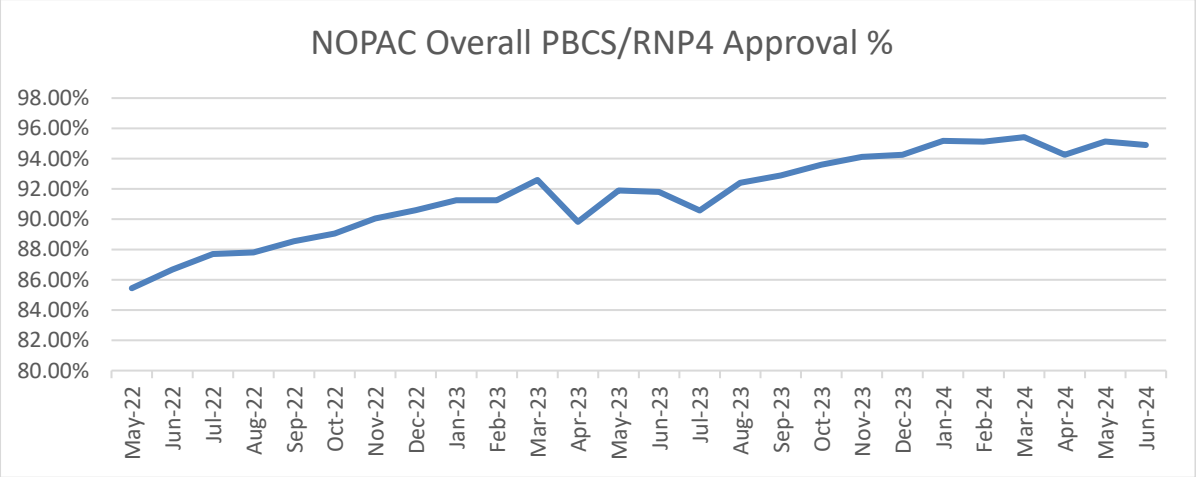

Figure 1: NOPAC Overall PBCS/RNP4 Approval Percentage

1.2 Phase 2 was implemented on January 25, 2024. A new westbound ATS Route, named M523 was published between R220 and R580 (see **Figure 2**).

a) R220 remains a westbound route with PBCS/RNP4 approval required from FL340 to FL400.

b) M523 is a new westbound route open to PBCS/RNP4 approved aircraft from FL340 to FL400. M523 is closed to aircraft FL330 and below and FL410 and above. The reason for the closure to traffic at or below FL330 and at or above FL410 is because there may be non-PBCS/RNP4 approved traffic on the adjacent tracks R220 and R580 at those altitudes.

c) R580 changed to be an eastbound route with PBCS/RNP4 approval required from FL340 to FL400.

d) A590 remains unchanged with no PBCS restrictions.

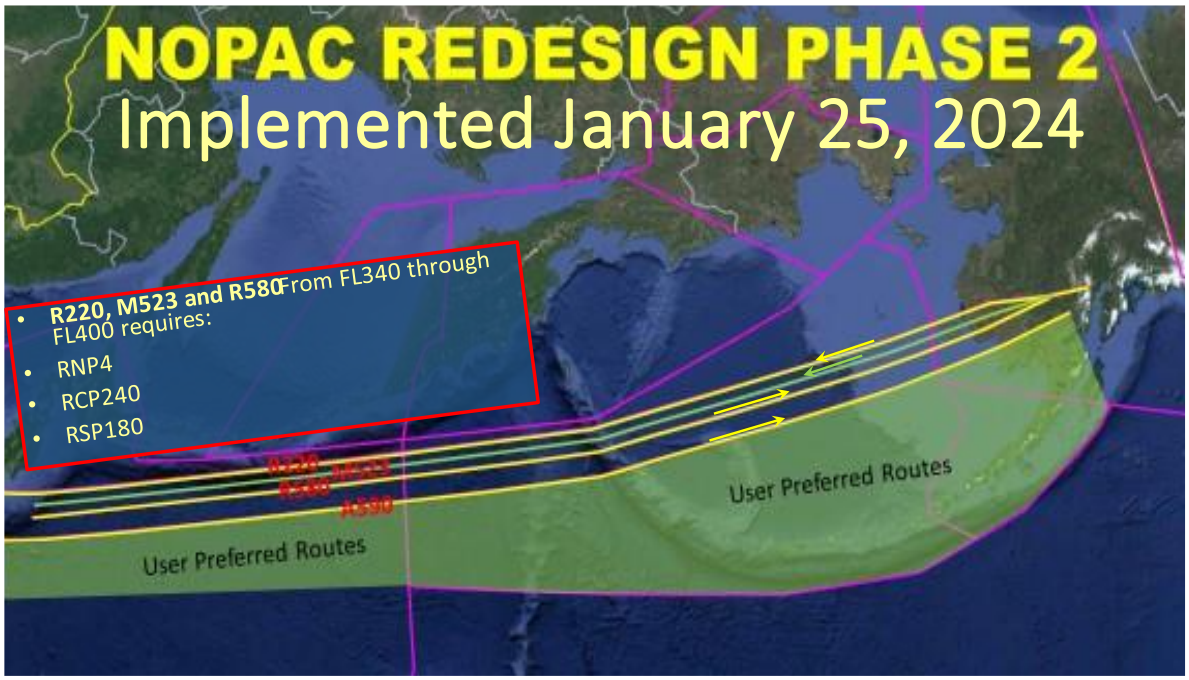

Figure 2: NOPAC Redesign Phase 2

e) Westbound PACOTS Tracks are published via R220 and 50 NM south of A590.

f) Eastbound PACOTS Tracks are published via R580, A590 and 50 NM south of A590.

g) UPRs are allowed via the 4 NOPAC routes and 50 NM south of A590.

h) The criteria to proceed to Phase 3 would include:

i) Successful implementation of Phase 2 with no adverse impacts that were not safely mitigated.

ii) Operators are correctly complying with the Phase 2 ATS Routes PBCS/RNP4 restrictions.

1.3 Phase 3 was initially planned for late 2024. But issues with data link connectivity have delayed Phase 3 until data link reliability and availability is improved.

1.4 When implemented, Phase 3 will create a new eastbound ATS Route, named N507, which will be at least 25NM south of R580 (see **Figure 3**).

a) R220 remains a westbound route with PBCS/RNP4 approval required from FL340 to FL400.

b) M523 remains westbound route open to PBCS/RNP4 aircraft from FL340 to FL400. M523 is closed to aircraft FL330 and below and FL410 and above.

c) R580 remains an eastbound route with PBCS/RNP4 approval required from FL340 to FL400.

d) N507 will be a new eastbound route open to PBCS/RNP4 aircraft from FL340 to FL400. N507 is closed to aircraft FL330 and below and FL410 and above.

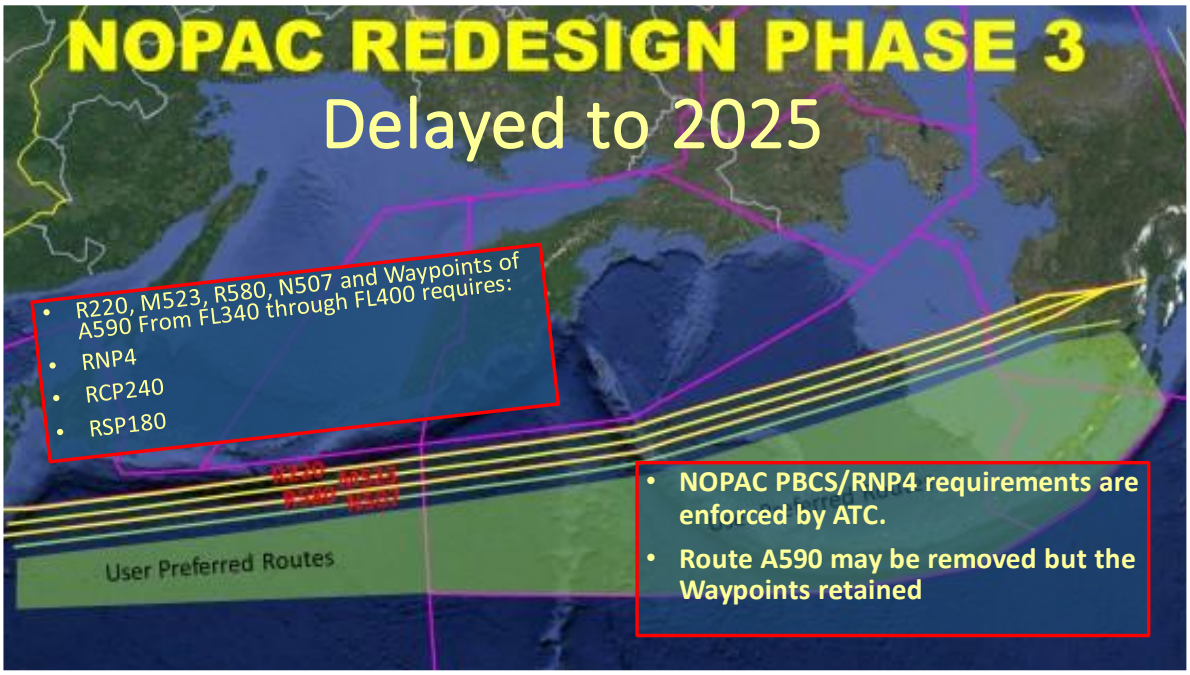

Figure 3: NOPAC Redesign Phase 3

e) Westbound PACOTS Tracks would be published via R220, M523 or 75 NM or more south of N507.

f) Eastbound PACOTS Tracks would be published via R580, N507 or 75 NM or more south of N507.

g) UPRs would be allowed via the 4 NOPAC routes, the waypoints of A590 or 75 NM or more south of N507.

1.3 Rules for joining the NOPAC route system are published via PAZA NOTAM and the Japan AIP.

1.4 After implementation of Phase 3, the 4 NOPAC routes will have been compressed into less airspace than 3 routes previously occupied. The Phase 3 PBCS/RNP4 routes will allow for the efficient movement of large volumes of traffic through the NOPAC routes. A significant volume of airspace south of the Phase 3 NOPAC routes previously occupied by A590, R591 and G344 will be available for more efficient flexible PACOTS routes and UPRs. After implementation of Phase 3, the airspace will be monitored for any issues and procedural adjustments may be made when required. As the percentage of PBCS/RNP4 approved aircraft increases, adjustments may be made to increase the PBCS altitude stratums to improve efficiency.

2. DISCUSSION

2.1 For several years, JCAB, IATA and the FAA have taken many efforts to ensure operators are aware of the future NOPAC Redesign Project requirements for RCP240, RSP180 and RNP4 on the NOPAC routes. IATA supported the project and coordinated with their members and made them aware of the project requirements. Data was collected to identify non-IATA operators with 10 NOPAC flights or more during the 7-month data collection period. Those operators were contacted and advised of the details of the NOPAC Redesign Project.

2.2 The percentage of PBCS/RNP4 approved aircraft operating in NOPAC is very high, around 95 percent. The NOPAC Redesign Project has been a collaborative effort to take advantage of the enhanced capabilities in the airspace to improve airspace efficiency. After almost 7 years of work on the project, operator coordination, airspace studies, COVID-19 setbacks and operator investment, the NOPAC Redesign Project has moved into Phase 2. JCAB and the FAA appreciate all the support from IATA and the operators that was received to progress this project.

2.3 There are still NOPAC Redesign challenges to face. In order to apply the 23 NM PBCS lateral separation minimum required between the Phase 2 and 3 NOPAC routes, aircraft must obtain PBCS approval and maintain data link connectivity. While many aircraft have obtained PBCS approvals, in 2024 there have been issues with aircraft data link connectivity. Many of these issues were the result of Communication Service Provider (CSP)/Satellite Service Provider (SSP) data link network outages, but there are also ongoing issues related to individual aircraft performance. FAA and JCAB data link experts are working to identify data link connectivity issues and find solutions to improve the reliability of data link connectivity with aircraft.

2.4 Traffic levels in many traffic flows are exceeding pre-COVID19 levels. Oceanic controllers are more dependent on reduced separation minima to manage the traffic in oceanic airspace. These reduced oceanic separation minima are reliant upon PBCS availability. Both aircraft must have a working PBCS connection to apply the minima. If one aircraft loses the PBCS connection, controllers must revert to minima without PBCS requirements that are two to three times larger. This can create major disruptions to traffic flows. This is especially true with the NOPAC Redesign routes that are 25 NM apart. A network outage can cause closure of a route and descent of many of the aircraft on the routes to reestablish separation. Controllers need a more reliable data link connection to the aircraft and a way to mitigate the impact to Air Traffic operations when aircraft connectivity problems occur.

2.5 Data Link network outages should not be accepted as a regular expected occurrence. The surveillance and communications data that are carried over these networks are key ATC safety components. Over the past several years, the data link network has not met Performance-Based Communication and Surveillance (PBCS) RCP240/RSP180 availability requirements. **Figure 4**

illustrates the combined total duration of impact for unplanned outages greater than 10 minutes within the Oakland (ZOA), Anchorage (ZAN), and New York (ZNY) oceanic FIRs, broken down by high level service affected. The corresponding safety target for RCP240/RSP180 availability is 520 minutes per year.

2.6 In the first seven months of 2024 Anchorage Center experienced 1,683 minutes of impact from unplanned data link network outages and degradations. The RSP availability safety criteria is 0.999, which equates to 520 minutes of accumulated unplanned outages time in minutes/year. This is 3 times over the allowed outage minutes in the Anchorage Oceanic area with 5 months still to go in the year. Changes need to occur to improve the data link network availability.

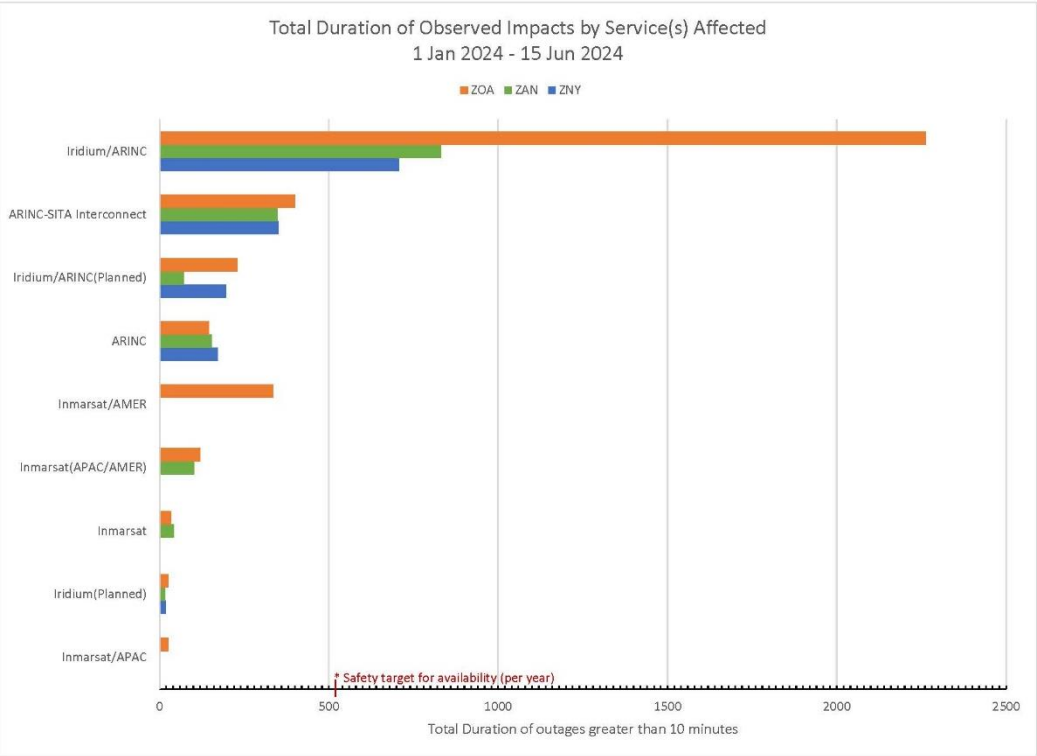

Figure 4: January 1-June 15, 2024 minutes of Data Link Network Outages

2.7 When data link connectivity is lost with an aircraft and a reduced separation minimum with PBCS requirements is being applied, controllers must revert to another larger standard minima without PBCS requirements. This is especially difficult where aircraft are established in a parallel route system separated by the 23 NM lateral minimum. If traffic levels on the parallel routes are high the controller is required to issue several altitude and route change clearances to reestablish separation. This potentially introduces a higher risk than allowing the aircraft to continue with the 23 NM lateral separation until the data link network outage is restored.

2.8 Some FIRs in the Northern Atlantic (NAT) implemented flexible tracks separated by one half degree using the 23 NM lateral minimum. When traffic is busy, there would potentially more risk in reverting to a larger lateral separation minimum than allowing the aircraft to continue with the 23 NM lateral minimum until the data link network outage is restored. It is our understanding that some ANSPs developed contingency procedures for the NAT ½ degree tracks which give the controller the option to continue with the 23 NM lateral separation minimum for aircraft established in oceanic airspace when it is not feasible to revert to larger non-PBCS lateral minima until the data link network outage is restored or the aircraft exit oceanic airspace. No new aircraft pairs are allowed to enter oceanic

airspace separated by a reduced minimum with PBCS requirements while the data link network outage is continuing.

2.9 Regional Contingency procedures as are used in the NAT would be beneficial to the Asia Pacific Region. The contingency procedures would encourage the NOPAC Redesign project to advance to Phase 3 and the development of more parallel route systems separated by 23 NM laterally in other FIRs.

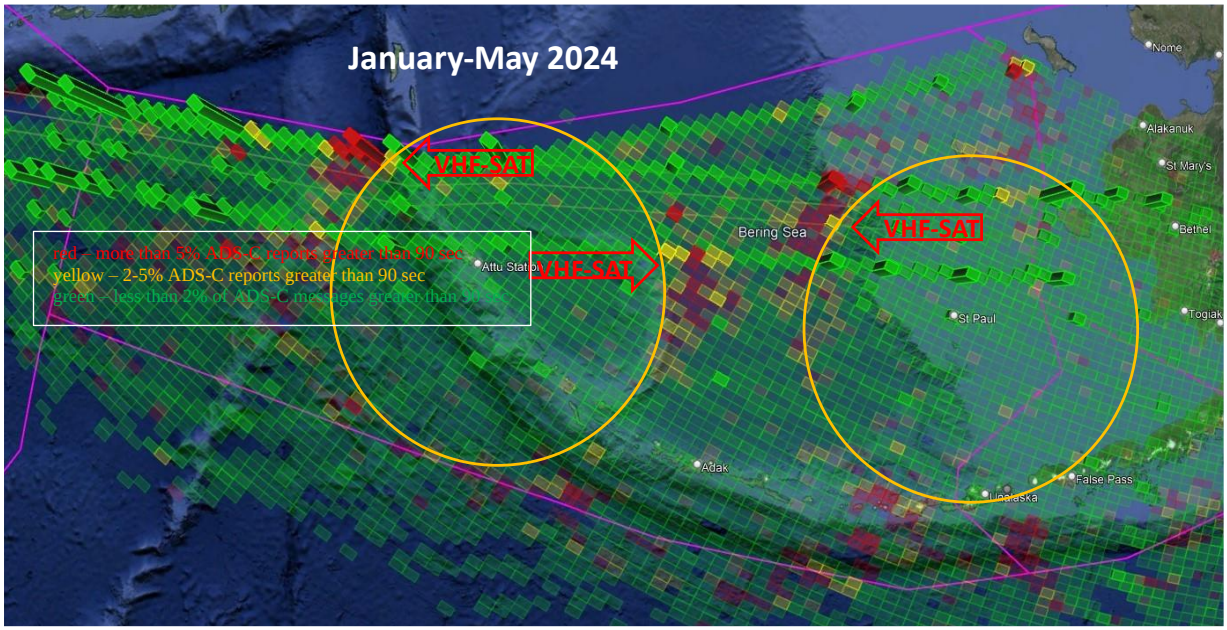

Figure 5: January -May 2024 PAZN FIR ADS-C Reports

2.10 One of the most impactful aircraft-specific connectivity problems in the Anchorage airspace are caused by VHF Data Link (VDL) to Satellite (SAT) transition issues. Because Anchorage has multiple VDL stations providing significant VDL coverage in their oceanic FIR, aircraft are likely to encounter VDL to SAT transitions, which is a top contributor to poor performance and connectivity issues. **Figure 5** illustrates the approximate VDL coverage and the areas with the most significant performance issues observed.

2.11 While the VDL-SAT transition underperformance issue has been highlighted as one of the top causes of failure to meet PBCS latency requirements in the monthly PBCS monitoring efforts, ongoing issues for individual aircraft are often masked if the performance observed in the rest of the FIR is meeting the requirements, and therefore all affected aircraft will not get flagged and reported. However, these recurring issues impact the ability to use PBCS separation because of loss of eligibility (corresponding alerts to controllers) when connection is lost or excessive latency occurs. Certain operator/aircraft types are observed to perform notably worse than others. Operators are encouraged to review the NAT OPS Bulletin 2019_003 Rev 5, *Data Link Performance Improvement Options*, and review the solutions to this issue that are relevant to their aircraft. In particular, it is noted that the software with the new "RAT1" timer, intended to improve performance for FANS 1/A downlink messages during VDL-to-SAT transition areas, is currently available for many aircraft types.

2.12 While the NOPAC Redesign Project is facing some challenges, it is a good example in the APAC region that collaborative work with States/Administrations, operators and international organizations is essential to achieve an enhancement of airspace capacity. Implementation of reduced separation minima and more beneficial ATS routes is needed. JCAB and the FAA continue to work on improving efficient operation in NOPAC and other airspace volumes. We will continue to share our

experience and progress to contribute to improving airspace capability and efficiency in the APAC region.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) Note the information contained in this paper and support the NOPAC Redesign Project, and:

b) Advocate for operators with poor VDL-SAT transition performance implement FMC upgrades to improve transition performance, and:

c) Increase oversight of DSP and SSP that don't meet PBCS availability requirements to improve data link network availability to an acceptable level, and:

d) Support the development of Regional data link network outage contingency procedures which support enhanced route systems during data link network outages, and:

e) Discuss any relevant matters as appropriate.

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